Denison (C.)

Compliments of the Author.

TRACTION PLASTERS FOR TEMPORARILY CONTRACTING AN AFFECTED LUNG, IN LIEU OF THE MURPHY OPERATION.

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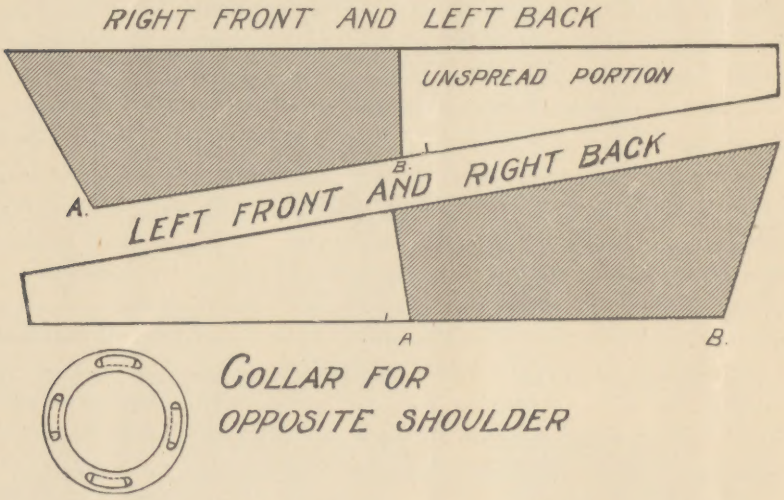
My object in presenting this paper is to offer and illustrate a better way than has heretofore been obtained to control thoracic movement on one side and confine respiration to the unaffected lung. This method is a perfectly evenly, and easily applied means to nearly annul the use of one lung, and therefore temporarily a suitable method to arrest pulmonary hemorrhages when from a known localized source; a way also to control ordinary or tubercular pleurisy, complicated or not with adhesions and pneumonia; or to limit and contract a pulmonary cavity especially if located low down in a lung. Here the descent of the diaphragm in breathing disturbs and over-distends a cavity and thus produces strain and rupture of implicated blood vessels.

Messrs. Seabury & Johnson of New York have succeeded in making for me the special form of plasters desired, and the following is an illustration of what we will call a set or pair. These traction plasters are made suitable for use on either half of the thorax, and the collar is made to encircle the opposite shoulder.

The plasters are spread on the attachable surfaces A to B. as shown in the cuts, of strong muslin so thick and firm that it will not wrinkle on pulling. They are large and long enough to fit a good sized man, all requirements of smaller sizes being possible by paring these down to the required dimensions. The collar, too, can be cut and made smaller very easily. These traction plasters when applied, lapping over each other in the axillary region, completely encircle the side to be compressed. The source of power for traction being above and out of the way of the other lung, that one is left temporarily to do the respiratory work of both lungs. This in a good measure it

does do according to the accompanying test measurements. Note the illustrations of the application of the plasters on a 15-year-old boy who has grown seven inches in a year, and therefore his chest can be assumed to be very flexible and yielding. His natural chest movements are: Circumference, 29½ and 33¾ inches, or 4¼ inches expansion, the right being 15½ and 17 inches and the left 15 and 16½, each side approximately 1½ inches. (My explanation of the usual inequality between the circumferential movement and that of the combined two sides measured separately is that in the latter instance the skin may move and the measuring tape has a tendency to follow the upward movement

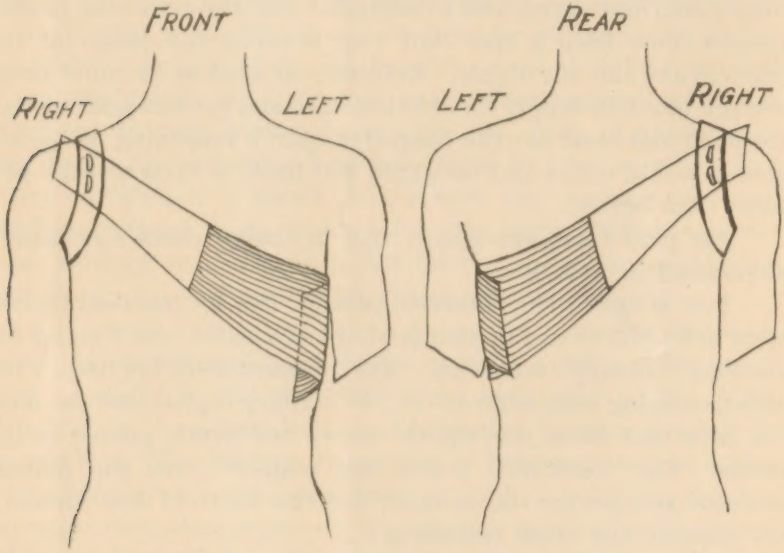


of the underlying ribs.) Now with the plasters on the left side and drawn tight, this youth's measurements are: Total, 29½ and 31¾, or 2¼ inches; left, 15 and 15¼, and right 15½ minus and 17½ inches, or over 2 inches, showing conclusively that the work is thrown onto the unbound lung.

For comparison I chose a mature, fine chested, and hard working teacher of Swedish gymnastics and applied the plaster to the same side, the left. Total measurement, 33½ and 37; right, 16½ and 18½, equals 2; and left, 17½ and 18, equals ½ inch. Plasters off, total, 33½ and 38 inches; right, 16½ and 18½, equals 2; left, 16½ and 18¼, equals 1¾. Considering that the strength of expansion was so great in this trial that the safety pins gave

way, the limiting power of the plasters when applied to an invalid will be easily comprehended. In fact the comfort of the patient will often have to be conserved by *not* pulling the plasters toward the collar as tightly as possible.

The most serviceable application of these traction plasters seems to me to be for the checking of pulmonary hemorrhages. Only inferentially suggesting the damage possible where a mistake is made in the application of this method, due to wrong reasoning as to *where* a pulmonary hemorrhage comes from, I will say that, when rightly applied, no other plan, in my judgment, surpasses this one in the surety of result and the confi-



dence given both the patient and physician. The application of this method is most suitable when the diagnosis unmistakably points to the usual engorgement of blood which Niemeyer, I believe, was the first to intelligently explain. (I never felt sure my students understood this till they could explain why and how the blood of a pulmonary hemorrhage is arterial [red blood] and not venous as in engorgement elsewhere.)

I wish to call attention to the frequency with which this engorgement and rupture occur in the left infra-clavicular space, and I will illustrate the good effect of the method of treatment by the following case:

In February, 1895, I was called in consultation by Dr. White of Trinidad, Colo., to see C. L. W., who had had repeated pulmonary hemorrhages occurring every two or three days for over two weeks. The recurrence was not checked by the usual astringent and anodyne treatment which had been properly administered, mostly by hypodermatic injections. The patient, a tall Virginian, who had come to Colorado eight years previously after four years of ill health (hemorrhages, etc.), was pretty thoroughly exhausted by the loss of blood and the apparent hopelessness of arresting the same. There was dullness on percussion, obstructed breathing, and moist rales on coughing in the left infra-clavicular space, and I concluded that the recurring hemorrhages came from a spot half way between the center of the clavicle and the left nipple. Evidently as soon as he could make enough blood to supply the previous loss and get strength enough to cough and clear out the congested spot, a reopening of the old source would occur and he would fall back, a little weaker perhaps than before.

The plan I had previously tried in similar cases was readily acquiesced in, namely:

Two strips of raw adhesive plaster, five by fourteen inches, were sewn end to end to similar strips of muslin, and a collar for the right shoulder was made. The plasters were applied to the chest, crossing each other in the left axillary region, and the muslin, front and back, was tightly drawn and firmly pinned to the collar. The confidence which this support gave the patient augured success for the method, and the recovery was uneventful without any other treatment.

Another illustration of a more prolonged management of such a case where the hemorrhages were from a large excavation is summarized as follows:

Mr. M., July, 1892, age 33, a Kentuckian, who had been in Colorado seven years. Naturally of strong constitution and no inheritance to consumption, but very sick in childhood, "whooping cough, lung fever at times and bronchitis for twenty-nine years." Erysipelas nine years previous to date given. Came to New Mexico in 1876 from Kentucky; back and forth, east and west, his wayfaring life led to complications along in the nineties. In November, 1891, had grippe and then recurring hemorrhages;

and in December was confined to bed and was three months in hospital with more hemorrhages and a profuse purulent bronchorrhoea. In March, 1892, went to San Antonio, Texas, but had hemorrhages there. On return to Denver was confined another month with constantly recurring hemorrhages on the least exertion, and was pretty well discouraged and unable to leave his bed when I first saw him in June, 1892. A large bronchiectatic cavity was found in right infra-scapular region reaching up into the inter-scapular space, and another small bronchiectatic spot similarly located in lower left inter-scapular region from which he bled in the following August. The hemorrhages from the right large cavity in May were, to me, explained by the strain produced in the descent of the diaphragm on deep breathing or coughing. The modus operandi of the mechanical means of relief depended on are easily understood on that basis. The hemorrhages were controlled without medication by the use, first, of plasters as described in the preceding case, then, later, by a jacket which was finally modified to a corset with straps and buckles (see cut), which he refused to go without for two years. Whenever any blood spitting occurred while out on the street he would step aside in an alley and pull up his straps and thus arrest it.

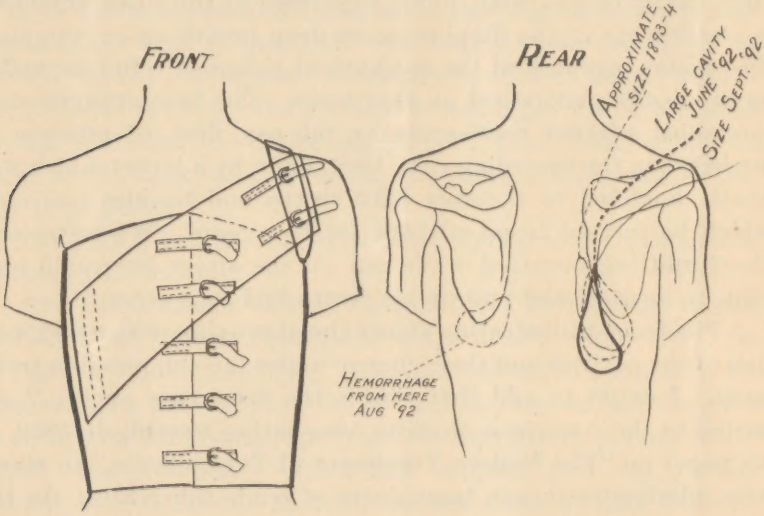
The second illustration shows the approximate size and location of the cavities and their change under the compression treatment. I ought to add that this is the same case as No. 2, reported to the American Medical Association meeting in 1898, in my paper on "The Modern Treatment of Tuberculosis," to whom were administered such large doses of crude tuberculin; for the case was tubercular, as proved by abundant tubercle bacilli found in his purulent expectoration.

The management of these cavity and bronchiectatic complications of lung disease necessarily introduces the consideration of the question of intra-thoracic air pressures, a subject I have been much interested in.* Such a study naturally brings under discussion the operation elaborated and illustrated at the Denver meeting of the American Medical Association by Dr. J. B. Murphy of Chicago. This is to annul the action of the affected lung by injecting nitrous oxide gas into the adjoining pleural cavity.

*See "Abnormal Intra-Thoracic Air Pressures and Their Treatment," president's address, Denver meeting, September, 1890, the of American Climatological Association.

As I am opposed to this method of procedure, because it seems to me to be an uncalled-for surgical operation, I will take this occasion to explain why the theory which actuates this interference with nature's processes seems to me indefensible as a general postulate. At most it can only be defended as an exceptional advantage.

While it is true that a diseased lung, when acutely affected and painful, can be healed and treated better if it is rendered inactive, yet it is also true that the life of the lung is its activity, and unrelieved compression will soon annihilate the use of a given lung. This surgical operation, to be successful, should be



based upon a more searching and thorough physical diagnosis than I suspect is generally made by physicians and surgeons. My own experience has proved to me that both lungs are affected in a much larger percentage of cases than generally believed, and this operation depends upon one lung being in a normal condition. The "putting to rest" of the diseased portion of a lung is to be obtained by the possible annihilation of the remainder of that lung. Nature's protective pleuritic adhesions and peripheral fibroid process, the evident purposes of which are to stiffen and support the affected portion, throw nearly all the contracting process possible to occur upon the unaffected portion operated on. This was the impression confirmed into a con-

viction by the first Murphy operation I saw performed in Chicago last summer. The sacrificed good lung may, *perhaps*, afterwards be redeemed to some use; but the risks are too great, and the main object of treatment, the elimination of tuberculosis, is ignored.

The teaching of a quarter of a century of experience on the part of the medical profession is controverted by the general acceptance, if it were possible, of this theory. If that medical experience cited has elicited and proved one thing more than another in our fight against pulmonary tuberculosis, it is that high altitude, exercise, and a proper method of inhaling, which, to my mind, involves *exhaling against pressure*, constitute the best means possible to limit this disease. Why? Because in curable cases these means open up to the inhaled, pure, or antiseptic air the affected lung areas which the proposed operation is intended to close. The operation is not without other dangers to the individual aside from the imprisonment in unventilated spaces of septic material; for instance, the shock to the system and the liability of wounding the healthy lung in the procedure. In those cases where it is evidently required to "put to rest" temporarily a portion or the whole of the lung, the method I have described can be applied with much certainty of obtaining beneficial results.

The mechanical condition within the thorax needs to be recognized as one of *negative* pressure, i. e., it averages much more on that than on the side of *positive* air pressure. During inspiration it is decidedly negative, and only positive during expiration, voluntary exertion excluded. But with voluntary effort included, inspiration is even more *less positive* than is expiration, as shown by our usual ability to expel about twice as much force, recorded in millimeters of mercury by the manometer, as we can draw into the lungs by forced inspiration. The total physical state within the thorax is then *negative* throughout life, as stated by W. Einthoven and confirmed by W. N. Northrop, W. Gilman Thompson, the late Joseph O'Dwyer, and others.

This is most important—the chief—of all considerations to be kept in mind by the surgeon who undertakes to operate through the thoracic walls to reach any cavity or air space connected with the bronchial tract. It is undoubtedly the explana-

tion of more than one sudden death, resulting from ill-advised effort to aspirate a bronchiectatic or other cavity within the lung.

The difficulties and dangers which this consideration imposes upon surgical interference with the respiratory organs, with their delicate vascular supply quickened commensurate to their small area compared with the many times greater area of the systemic system, were the incentives for devising, first, a rapid way to enter the chest wall by resection of a rib; and, second, a drainage tube which would control the ingress of air and so counteract this negative pressure. The rib cutter and the valvular drainage tube which I presented to the profession several years ago answer these purposes very nicely. The former gives ample power to one hand, after an inch and a half incision is made over a rib, to make a clean excision of one to three inches of a rib; and the immediate introduction of the latter, following puncture with a blunt instrument, is possible, so that no fearful aspiration inwards of the contents of a bronchiectatic cavity can occur.

In conclusion, it is evident that this negative pressure state within the thorax aids the permanent shrinkage process due to the fibroid tendency in most chronic lung cases, so that an irritative or inflammatory disease can be made to heal more readily by putting the part *to rest;* and this quiescence is undoubtedly produced by the gas injected and intended to remain in the adjoining pleural cavity. It remains to be determined by experience, however, if the undesired action of the affected lung can not be as well checked by the outward use of these traction plasters, while the undesirable and uncertain features of a complicated surgical procedure are avoided.